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ADDRESS OF THE RETIRING PRESIDENT OF THE
SOCIETY, IN AWARDING THE BRUCE MEDAL
TO PROFESSOR G. V. SCHIAPARELLI.

BY JOHN DOLBEER.*

The statutes for the bestowal of the Bruce Medal of the Astronomical Society of the Pacific direct that the President "in his address at the annual meeting of the Society in March is to announce the award and the reasons for making it." Complying with the statutes, I therefore take pleasure in announcing that by unanimous vote of the Board of Directors the Bruce Medal for the year 1902 was awarded to Professor GIOVANNI VIRGINIO SCHIAPARELLI, "for distinguished services to astronomy."

Every member of the Society will doubtless agree that no more worthy recipient of the medal could be found than Professor SCHIAPARELLI; and that it is especially appropriate that he should receive it at this time, when he has retired from the directorship of the observatory made famous throughout the world by his labors during the past forty years. For, unlike many, if not most, other medals founded to encourage astronomical work, the Bruce Medal is not bestowed as an award for some one particular research or discovery, however brilliant, but rather as the mark of our recognition of the fact that the medalist, by his long-continued and successful labors, has made himself one of the great leaders in the advance of the science of astronomy.

In the minds of most intelligent people outside of the ranks of the professional astronomers, the name of SCHIAPARELLI is probably most prominently associated with the planet *Mars*; and it is unquestionably true that his remarkable studies of the physi-

* I am indebted to Professor R. G. AITKEN, of the Lick Observatory, for the collection and arrangement of the data contained in this address.

cal characteristics of that interesting planet form a strong claim to the high regard in which he is held by astronomers to-day. As one of our own members has said,—

“Professor SCHIAPARELLI has fixed the principal points of the planet’s surface by a survey, and he has shown that they have remained constant since the time of MAEDLER and KAISER. By a series of drawings, he has constructed a most admirable map of the planet. On this map he has located the continents and the seas; and has traced a very large number of ‘canals’ (narrow, straight, dark lines), and shown that many of them appear at times to be doubled. The elegant nomenclature he has adopted in his map will be a pleasure to the classical scholar who may examine it. It is a scholar’s review of antiquity. Professor SCHIAPARELLI has, however, been very chary of hypotheses. . . . Most of his writings have been concerned with the pure results of observation, and he has scrupulously refrained from generalizations.”*

Another says:—

“He has extended our knowledge of the planet enormously in nearly every line,—in reference to the polar caps, the so-called seas and continents, but especially in reference to the so-called canals, their appearance and disappearance, their doubling, etc. His entire work bears the impress of a scientific spirit *par excellence*. His technical results are comprised in a few papers, and a dozen octavo pages suffice for a masterly popular exposition of his general results. His brief papers contain at least the suggestion of all the theories recently exploited by popular writers, though he was not concerned with establishing a theory, but rather with ascertaining facts.”†

But SCHIAPARELLI would rank with the foremost astronomers of our time if he had never published a paper on *Mars* or made a drawing of the planet. Not one of the three gold medals he holds, nor of the two Lalande prizes, was awarded to him for his studies on *Mars*. In fact, the gold medals were bestowed upon him before his work on *Mars* began.

Like AUWERS and GILL, our medalists in 1899 and 1900, SCHIAPARELLI’s early training specially fitted him for his future work. After six years spent in the University of Turin as student, especially of mathematics, engineering, and astronomy, and private tutor in mathematics, he received in 1856 a position as instructor in mathematics at the gymnasium in Turin. He held this position for only two months, however, having received orders from the government to continue his astronomical studies under ENCKE at Berlin. We find him, accordingly, applying

*Professor EDW. S. HOLDEN. *The Forum*, November, 1892.

†Professor W. W. CAMPBELL. *Science*, August 21, 1896.

himself to these studies for the two following years, taking courses as well in mathematics, physics, meteorology, terrestrial magnetism, etc., under such famous professors as ERMAN, WEIERSTRASS, POGGENDORFF, ARNDT, and OHM. To supplement these theoretical studies he next went to Pulkowa, and there spent a year in practical astronomical work under OTTO STRUVE and WINNECKE. He was now thoroughly prepared to enter upon his life work, and on the 30th of June, 1860, a young man of 25, he was appointed Second Astronomer at the Milan Observatory, then under the directorship of Professor CARLINI.

Forty years later, on June 30, 1900, when he resigned his position as Director of the Milan Observatory, the astronomers of Italy in testimony of their appreciation of his work, published a pamphlet entitled "All' Astronomo G. V. Schiaparelli, Omaggio 30 Giugno 1860-30 Giugno 1900," which recounts in detail the story of his scientific life and gives a complete list of his writings. In their address on this occasion, they call attention to his discovery a few months after assuming his duties at Milan, of a minor planet, *Hesperia*,—an event of more interest and significance in those days than at present,—and continue:—

"With this discovery, made so soon after your entrance in the Observatory di Brera, you began to draw the attention of the astronomical world upon your name, which, having quickly achieved greater titles to fame, the history of astronomy records with high honor, recalling your observations and your studies upon the comet of 1862; your theory of meteors; your many and accurate observations of double stars; your observations and discoveries upon the planets *Mercury* and *Venus*, and particularly *Mars*; your researches in and reconstruction of the story of the astronomical thought of ancient times; your careful study of the motion of the pole of terrestrial rotation, etc.; while the history of meteorology and of terrestrial physics and of natural philosophy in general will record your many contributions as of the highest importance."

It is obviously impossible to mention even the titles of all these important papers, to say nothing of giving an adequate account of their contents. In addition to the brief reference already made to his well-known observations on *Mars*, we must confine ourselves to a very short account of the researches first mentioned in the passage just quoted; his study of the comet of 1862, his theory of meteors, and his observations of double stars.

That comets and meteors are very closely related,—so closely as to point conclusively to a common origin,—is now so gener-

ally believed by astronomers, that it is hard to realize that their relationship was not clearly established until less than forty years ago. Such is nevertheless the fact. Though KEPLER, HALLEY, and one or two others conceived the idea that meteors were of cosmical origin, the prevailing belief to the close of the eighteenth century was that they were due to "atmospheric perturbations, exhalations of sulphur, *ignes fatui*, and so forth," while such eminent men as LAPLACE and OLBERS thought it more probable that the meteors were composed of matter discharged from volcanoes on the Moon. Observational data concerning these phenomena began to accumulate in the early part of the nineteenth century, observation being greatly stimulated by the *Leonid* shower witnessed by HUMBOLDT in 1799, and by the celebrated display of 1833. After seeing the latter, and reading HUMBOLDT's account of the former, OLMSTED was led to the conclusion that the appearance was due to the Earth's passage "through a storm, so to speak, of planetary bodies." He also first detected that the meteors of a shower *radiate* from a definite region of the sky—the radiant point.

In the period from 1833 to 1866 progress was rapid. Observers in Europe and America were zealous in collecting data, and NEWTON, ADAMS, ERMAN, KIRKWOOD, A. S. HERSCHEL, and many others were eagerly seeking the solution to the problems presented. NEWTON traced the recurrence of the *Leonid* shower, at intervals of about thirty-three years, back to the year 902; ADAMS determined with great accuracy the revolution period of the swarm from which the shower proceeds; and at about the same time SCHIAPARELLI concluded that the orbit of this swarm must be an elongated ellipse resembling the orbits of comets, rather than the nearly circular planetary orbits. The existence of many other radiants in the sky was established, and the study of the so-called sporadic meteors brought to light the diurnal and annual variations in their frequency and the relation of these variations to the orbital motion of the Earth and to the movement of the solar system in space.

Finally, SCHIAPARELLI, in 1866, computing an orbit for the August meteors, the *Perseids*, upon the assumption that their path was nearly parabolic, arrived at elements that were practically identical with those of TUTTLE's comet of 1862, and thus completed the proof of the cosmical origin of meteors.

SCHIAPARELLI, therefore, was but one of many toilers in this

field, and as in the case of nearly all great advances in scientific thought, his discovery had been foreshadowed and almost anticipated by some of his predecessors. But this does not in the least detract from the merits of his achievement. The actual discovery was his, and it is his distinction that by approaching the problem from a higher point of view and bringing to bear upon it a keener power of analysis, he was able to correlate the diverse phenomena and frame a comprehensive theory that would account for them all. So thoroughly did his writings on this subject, from 1863 to 1872, cover the ground, and so clearly did they point out the lines along which investigation should proceed, and the difficulties that remained to be overcome, that it may be said that the progress of the past thirty years in this important branch of astronomy has been mainly the elaboration of his ideas.

So far we have called attention only to SCHIAPARELLI'S researches within our own system,—for meteors and comets may be regarded as at least temporary members of the family of the Sun,—but no sketch of his career, however brief and inadequate, can omit mention of his notable contributions to our knowledge of the systems of the stars.

A student under OTTO STRUVE, a friend of Baron DEMBOWSKI, it is not strange that he should have been attracted to the study of double stars. Nor, remembering his habits of thoroughness, persevering industry, and attention to details, is it surprising that both the quality and the quantity of his work in this field entitle him to rank with the STRUVES, DEMBOWSKI, and BURNHAM, as one of the great double-star observers of the century. Nearly 12,000 observations of double stars are the result of his twenty-five years' labors with the 8-inch Merz equatorial, from February 7, 1875, to May, 1886, and with the 18-inch Repsold equatorial, from 1886 on. As his observing-list has always included the more important systems in reach of his instrument, the more interesting binary stars often being measured on as many as ten or fifteen nights in a year, it would be difficult to overestimate the value of this great mass of material to the double-star student of the present day; and its value will increase rather than diminish with the lapse of time.

Though he has now retired from the directorship of the Milan Observatory, I do not understand that Professor SCHIAPARELLI has given up his astronomical studies. In the larger leisure that he now enjoys, we trust that he may continue the researches

that have made him famous, and may still further advance our knowledge of the worlds about us.

I hand the Bruce Medal to you, Mr. Secretary, to transmit to Professor SCHIAPARELLI with the assurance of the high esteem in which we all hold his name, and with the expression of our heartiest good wishes that he may long enjoy the honors to which his great services have entitled him.

March 29, 1902.

ASTRONOMICAL OBSERVATIONS IN 1901.

MADE BY TORVALD KÖHL, AT ODDER, DENMARK.

VARIABLE STARS.

Z Cygni.*

| | | | | | |
|----------|-----|------------------------|-----------|-----|----------------|
| January | 10: | <i>Z</i> a little > d. | September | 2: | = b. |
| February | 6: | = e. | | 12: | = c. |
| March | 14: | utmost faint. | | 21: | id. |
| April | 21: | invisible. | | 24: | id. |
| May | 21: | id. | October | 9: | = d. |
| June | 29: | = c. | | 26: | < d. |
| August | 19: | > b. | | 30: | { < d. > e. |
| | | | November | 1: | = e. |
| | | | | 9: | < e. |
| | | | | 30: | invisible. |

S Ursæ majoris.†

| | | | | | |
|----------|-----|---------------------|-----------|-----|----------------|
| January | 10: | <i>S</i> invisible. | May | 4: | { > d. < c. |
| February | 6: | = g. | | 21: | id. |
| | 11: | id. | August | 17: | invisible. |
| | 15: | = f. | | 24: | id. |
| | 24: | { > f. < e. | September | 2: | id. |
| March | 9: | = e. | | 7: | < g. |
| | 13: | id. | | 12: | id. |
| | 20: | id. | | 19: | id. |
| | 23: | id. | September | 21: | id. |
| | 29: | id. | | 24: | id. |

* *Vide* the sketch in the *Publications* A. S. P., No. 48, page 69.

† *Vide* the sketch in the *Publications* A. S. P., No. 73, page 56.